

What is claimed is:

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A1 1. An image processing apparatus for processing image data indicating a density of each pixel of an image, the apparatus comprising:

an edge detecting portion for detecting an edge area in the image in accordance with the image data;

an edge enlarging portion for enlarging the edge area detected by the edge detecting portion; and

10 a density correcting portion for increasing or decreasing the density of the image data of the edge area enlarged by the edge enlarging portion.

2. The image processing apparatus according to claim 1, wherein the edge detecting portion includes a first order differential filter for operating the first order differential of the image data so as to determine the edge area whose first order differential is larger than a predetermined value.

3. The image processing apparatus according to claim 20 1, wherein the image data includes a black component and color components, and the density correcting portion increases a density of the black component and decreases the densities of the color components.

4. The image processing apparatus according to claim 25 1, further comprising a controller for controlling the enlarging degree in the edge enlarging portion.

5. The image processing apparatus according to claim 4, wherein the controller indicates the enlarging degree in accordance with a kind of the image, and the edge enlarging portion changes the enlarging degree in accordance with the

indication of the controller.

6. The image processing apparatus according to claim 5, wherein one kind of the image is a monochromatic image and the other kind is a color image.

5 7. The image processing apparatus according to claim 1, wherein the edge enlarging portion enlarges the edge area inside the image but does not enlarge outside the image.

8. The image processing apparatus according to claim 7, wherein the edge enlarging portion decides the inside and  
10 the outside of the image in accordance with the lightness component of the image data.

9. The image processing apparatus according to claim 1, wherein the density correcting portion includes a density  
15 detecting portion for calculating an average density of the image data of the plural pixels included in a predetermined area, and a correcting portion for correcting the degree of increasing or decreasing each color component in accordance with the average density calculated by the density  
detecting portion.

20 10. The image processing apparatus according to claim 1, wherein the density correcting portion includes a density detecting portion for calculating a median density of the image data of the plural pixels included in a predetermined area, and a correcting portion for correcting  
25 the degree of increasing or decreasing each color component in accordance with the median density calculated by the density detecting portion.

11. An image processing apparatus for processing  
image data indicating a density of each pixel of an image,  
30 the apparatus comprising:

an edge detecting portion for detecting an edge area in the image in accordance with the image data;

an edge enlarging portion for enlarging the edge area detected by the edge detecting portion;

5 a modifying portion for modifying the edge area enlarged by the edge enlarging portion in accordance with the lightness information thereof; and

a density correcting portion for increasing or decreasing the density of the image data of the edge area  
10 modified by the modifying portion.

12. The image processing apparatus according to claim 11, wherein the edge detecting portion includes a first order differential filter for operating the first order differential of the image data so as to determine the edge  
15 area whose first order differential is larger than a predetermined value.

13. The image processing apparatus according to claim 11, wherein the image data includes a black component and color components, and the density correcting portion  
20 increases a density of the black component and decreases the densities of the color components.

14. The image processing apparatus according to claim 11, further comprising a controller for controlling the enlarging degree in the edge enlarging portion.

25 15. The image processing apparatus according to claim 14, wherein the controller indicates the enlarging degree in accordance with a kind of the image, and the edge enlarging portion changes the enlarging degree in accordance with the indication of the controller.

30 16. The image processing apparatus according to claim

15, wherein one kind of the image is a monochromatic image and the other kind is a color image.

5 17. The image processing apparatus according to claim 11, wherein the modifying portion cancel the enlarged edge area enlarged in the outside of the image by the edge enlarging portion.

10 18. The image processing apparatus according to claim 17, wherein the modifying portion decides the inside and the outside of the image in accordance with the lightness component of the image data.

15 19. The image processing apparatus according to claim 11, wherein the density correcting portion includes a density detecting portion for calculating an average density of the image data of the plural pixels included in a predetermined area, and a correcting portion for correcting the degree of increasing or decreasing each color component in accordance with the average density calculated by the density detecting portion.

20 20. The image processing apparatus according to claim 11, wherein the density correcting portion includes a density detecting portion for calculating a median density of the image data of the plural pixels included in a predetermined area, and a correcting portion for correcting the degree of increasing or decreasing each color component in accordance with the median density calculated by the density detecting portion.

25 21. An image processing apparatus for processing image data indicating a density of each pixel of an image, the apparatus comprising:  
30 an edge detecting portion for detecting an edge area in

the image in accordance with the image data;

an edge enlarging portion for enlarging the edge area detected by the edge detecting portion;

5 a density correcting portion for increasing or decreasing the density of the image data of the edge area enlarged by the edge enlarging portion; and

a detecting portion for detecting a monochrome and color ratio of the image data, wherein the edge enlarging portion changes the enlarging degree in accordance with the  
10 detected result of the detecting portion.

22. The image processing apparatus according to claim 21, wherein the edge detecting portion includes a first order differential filter for operating the first order differential of the image data so as to determine the edge  
15 area whose first order differential is larger than a predetermined value.

23. The image processing apparatus according to claim 21, wherein the image data includes a black component and color components, and the density correcting portion  
20 increases a density of the black component and decreases the densities of the color components.

24. The image processing apparatus according to claim 21, wherein the edge enlarging portion enlarges the edge area inside the image but does not enlarge outside the image.

25 25. The image processing apparatus according to claim 24, wherein the edge enlarging portion decides the inside and the outside of the image in accordance with the lightness component of the image data.

26. An image processing method for processing image  
30 data indicating a density of each pixel of an image, the

method comprising the steps of:

detecting an edge area in the image in accordance with the image data;

5 enlarging the edge area detected by the edge detecting portion; and

correcting the density by increasing or decreasing the density of the image data of the edge area enlarged by the edge enlarging portion.

10 27. The image processing method according to claim 26, wherein the image data including a black component and color components, and the density correcting step includes increasing a density of the black component and decreasing the densities of the color components.

15 28. The image processing method according to claim 26, further includes the step of controlling the enlarging degree in the edge enlarging step.

20 29. The image processing method according to claim 28, wherein the controlling step includes the step of indicating the enlarging degree in accordance with a kind of the image, and the edge enlarging step includes changing the enlarging degree in accordance with the indication of the controlling step.

25 30. The image processing method according to claim 29, wherein one kind of the image is a monochromatic image and the other kind is a color image.

31. The image processing method according to claim 26, wherein the edge enlarging step includes the step of enlarging the edge area not outside the image but inside the image.

30 32. The image processing method according to claim 31,

wherein the edge enlarging step includes the step of deciding the inside and the outside of the image in accordance with the lightness component of the image data.

5 33. The image processing method according to claim 26, wherein density correcting step includes the steps of detecting density by calculating an average density of the image data of the plural pixels included in a predetermined area, and changing the degree of increasing or decreasing each color component in accordance with the average density  
10 calculated by the density detecting step.

34. The image processing method according to claim 26, wherein density correcting step includes the steps of detecting density by calculating a median density of the image data of the plural pixels included in a predetermined  
15 area, and changing the degree of increasing or decreasing each color component in accordance with the median density calculated by the density detecting step.

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